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ABSTRACT

These national standards contain information for establishing and operating effective apprenticeship programs for dental technicians. Included in the volume are the following: definitions; provisions of the standards (equal opportunity in apprenticeship; terms of apprenticeship; apprenticeship agreements; ratios of apprentices to dental technicians; probationary periods; credit for previous experience; hours of work; compensation; examinations; work experience; related instruction; apprentice records, reports, and examinations; selection procedures; accident prevention; adjusting differences; and certificates of completion of apprenticeship); the apprenticeship and training policy of the National Association of Dental Laboratories; and guidelines for adapting national standards to local use (the national apprenticeship and training committee, employers and supervisors of apprenticeship and training, ratios of apprentices, filing with the registration agency, consultants, terms of apprenticeship, rates of pay, supervision, and modification). Concluding the guide are specifications of the training hours for dental technicians in the following areas: dentures, crown and bridge, ceramics, and casting. (MN)

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National Apprenticeship and Training Standards for Dental Technicians

U.S. Department of Labor
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Employment and Training Administration

Bureau of Apprenticeship and Training
Revised 1982

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NATIONAL APPRENTICESHIP AND TRAINING STANDARDS FOR DENTAL TECHNICIANS [1]

Definitions

Apprentice dental technician is an individual who is under an apprenticeship agreement to learn the trade of dental technician as outlined in these standards, and who is registered with the appropriate registration agency.

Dental technician is an individual trained to perform completely one or more specialized areas of the dental laboratory procedures required in the creation of a dental appliance—specifically, one who has completed a program of training and study in accordance with these standards, and who has been awarded a certificate of completion.

Certified dental technician is a dental technician who is qualified by training, education, and examination in accordance with the standards established by the National Board for Certification in Dental Laboratory Technology [2] for such certificate, and who continuously maintains those qualifications in accordance with the requirements for recertification.

Apprenticeship agreement shall mean a written agreement between an employer and the apprentice.

[1] Local application of these national apprenticeship and training standards in States having State apprenticeship agencies may require adaptation to meet the standards of apprenticeship in such States. The staffs of the Bureau of Apprenticeship and Training and of State apprenticeship agencies are available to advise on such standards.

[2] National Board for Certification in Dental Laboratory Technology is an agency of the National Association of Dental Laboratories.

Association shall mean the National Association of Dental Laboratories, Inc. For the purpose of this program, the association's address will be 3801 Mt. Vernon Avenue, Alexandria, Va. 22305.

Employer shall mean any member of the National Association of Dental Laboratories, Inc., who has the facilities and equipment to train apprentices in accordance with the terms and conditions of these national standards.

Supervisor of apprenticeship and training shall mean the individual selected by the employer to organize and administer the local apprenticeship program in accordance with these national standards.

Registration agency shall mean a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, U.S. Department of Labor, or in States where there is no recognized agency, it shall mean the Bureau of Apprenticeship and Training, U.S. Department of Labor.

Apprentices

1. Equal Opportunity in Apprenticeship

All programs of apprenticeship registered with the Bureau of Apprenticeship and Training, U.S. Department of Labor, must include in their standards the following equal opportunity pledge: "The recruitment, selection, employment, and training of apprentices during their apprenticeship shall be without discrimination because of race, color, religion, national origin, or sex. The sponsor will take affirmative action to provide equal opportunity in apprenticeship and will operate its apprenticeship program as required under title 29 of the Code of Federal Regulations, part 30."

a. Qualifications for Apprenticeship

To be eligible for dental technician apprenticeship, all applicants will be required to meet the following qualifications, as a minimum:

(1) At least 16 years of age unless State law requires a higher maximum age. (Proof of age required.) A maximum age limit may be required, if desired. Where a maximum age is established, it must be stated in the

program. Exceptions to the maximum age limit may be provided for honorably discharged veterans, for previous work experience in the trade, or to meet established minority apprentice employment goals and timetables.

(2) Must have successfully completed 4 years of high school, or furnish evidence of general education development equivalency.

(3) Must be physically fit to perform the work of the trade.

b. Affirmative Action Plan

In addition to establishing minimum qualifications for apprenticeship, each local program sponsor employing five or more apprentices will be required to develop and adopt an affirmative action plan which shall include goals and timetables for the selection of minority applicants and its local labor market analysis upon which such goals and timetables, or lack thereof, are based, and shall adopt a selection method consistent with the requirements of title 29 of the Code of Federal Regulations, as amended.

Any local program of the National Association of Dental Laboratories in which fewer than five apprentices are indentured shall not be required to adopt an affirmative action plan under section 30.4 or the selection procedure under section 30.5 of title 29, Code of Federal Regulations, part 30, as amended.

2. Term of Apprenticeship

Dental technician apprentices shall serve a minimum of either 4,000 or 6,000 hours in the trade (depending on which training specialty is chosen), such term to include probationary period.

The apprentice's progress in each phase of apprenticeship may be determined on a credit hour basis. Therefore, an apprentice who, by unusual aptitude and industry or because of past educational or practical experience, achieves the desired level of attainment in one phase of apprenticeship in less than the time designated may be advanced to the next phase. The determination of such achievement in less than the usual scheduled hours shall be made by the employer with the approval of the National Apprenticeship and Training Committee.

3. Apprenticeship Agreement [3]

The dental technician apprentice shall be covered by a written apprenticeship agreement, signed by the apprentice and the employer and registered with the appropriate registration agency.[4] Such agreement shall contain a statement making the terms and conditions of the local standards a part of the agreement.

The registration agency will be furnished a list of apprentice actions periodically when the registration agency does not otherwise require a copy of the apprenticeship agreement.[5]

4. Ratio of Apprentices to Dental Technicians

The provision in local standards covering the ratio of apprentices to journeymen shall be worked out in accordance with local practices, or as stated in local collective bargaining agreements.

No more apprentice dental technicians shall be employed than can be given proper supervision on the job and afforded employment opportunity on completion of apprenticeship. The ratio of dental technicians to apprentices shall be stated in the local program.

5. Probationary Period

Apprentice dental technicians employed under local programs shall be subject to a probationary period, not to exceed 3 months or 500 hours of reasonably continuous employment. Upon satisfactory completion of the probationary

[3] Some State apprenticeship agencies require the use of their own apprenticeship agreement forms. In such instances, the agreement forms may be obtained from the staffs of either the State apprenticeship agencies or the Bureau of Apprenticeship and Training, U.S. Department of Labor. If such is not the case, the sample forms included herein may be used.

[4] Where required by law and/or the local custom, the apprenticeship agreement will also be signed by the apprentice's parent or guardian.

[5] Registration agencies requiring a signed copy of the apprenticeship agreement for registration purposes are: Arizona, California, Kentucky, Louisiana, Maine, Massachusetts, Minnesota, New Hampshire, New Mexico, Oregon, Rhode Island, Washington, Wisconsin, and the District of Columbia.

period, apprentices will enter into an apprenticeship agreement with their employer and will be given credit towards their apprenticeship for training and time spent in probationary status. Apprenticeship agreements may be canceled at any time for due cause. The registration agency shall be advised of all cancellations and terminations of apprenticeship agreements.

6. Credit for Previous Experience

Upon a finding that applicants have had previous experience, either practical or educational, to qualify for advanced standing in the apprenticeship program, applicants may be given such advanced standing, subject to review by their employer on or before the end of the probationary period. Where such advanced standing is granted, apprentices will be paid at the rate for the period to which they have advanced.

7. Hours of Work

The workday and workweek for apprentices and conditions associated therewith shall be the same as those of other classifications of employees doing comparable work.

8. Compensation

Apprentices shall be paid for each hour spent in the dental laboratory and in related instruction during normal working hours at a progressively increasing schedule of wages to be established on a percentage of the prevailing local dental technician's wage rate. It is recommended that increases be granted at intervals of 1,000 hours or less.

Payments for tuition fees, books, and supplies required for approved courses, and gratuities upon the successful completion of the apprenticeship, may be granted in accordance with local custom.

9. Examinations

Apprentices shall be examined prior to advancement to each phase of their apprenticeship and whenever the employer considers it necessary to determine their progress. Consideration shall be given to related instruction and on-the-job work records and such other factors as are indicative of an apprentice's development in the skills of the trade.

10. Work Experience

Apprentices shall be taught the use, care, and effective handling of all tools and equipment commonly used in the trade. They shall be given work experience and training in the trade to assure them of the skill and proficiency which characterize a qualified dental technician, as herein defined. Such on-the-job training shall be carried on under the control of the employer or designated representative, under the direction and guidance of a qualified dental technician, certified dental technician, or graduate dentist.

11. Related Instruction

Apprentice dental technicians shall be required to attend classes in subjects related to the trade for a minimum of 144 hours per year. These classes may be given during or outside the regular working hours depending upon local practices and available facilities. All time spent in such classes after working hours shall not be considered as hours of work. If required to attend classes during the regular working hours, apprentices shall be compensated therefor at their regular hourly rate.

To provide appropriate instruction, in-plant courses may be given, utilizing company or outside personnel as teachers. Local high schools or colleges may be helpful in developing instruction material and providing for in-plant education. Local high schools, vocational schools, and colleges usually cooperate in offering related studies that can be taken after working hours.

12. Apprentice Records, Reports, and Examinations

The National Apprenticeship and Training Committee shall require the local employer to develop and keep such records as are necessary for the proper training of apprentices under these standards, as follows:

a. Application form for entrance into apprenticeship.
b. Tests or examinations as required for entrance and, periodically, for evaluation of progress and for completion.
c. Copy of registered apprenticeship agreement.
d. Periodic report forms.
e. Record of progress and attendance in related and technical instruction, and of selection standards and procedures.

13. Selection Procedures

Local apprenticeship program sponsors shall develop appropriate apprentice selection standards, procedures, and rating systems consistent with requirements of title 29, CFR, part 30, Equal Employment Opportunity in Apprenticeship and Training, as amended.

14. Accident Prevention

Apprentice dental technicians shall receive training and instruction in accident prevention and safe working habits both on the job and in related instruction, during their entire term of apprenticeship. Such instruction shall be coordinated with actual work performed on the job and tools and equipment used.

15. Adjusting Differences

The employer and the apprentice shall have the right and privilege of appeal to the National Apprenticeship and Training Committee in the event of disputes or controversies arising over any provision of the local apprenticeship standards which cannot be satisfactorily settled locally between them. The national committee shall hear all parties and make such adjustments as it may consider necessary.

16. Certificate of Completion of Apprenticeship

Apprentices who complete their apprenticeship and who have passed the required dental technician examination shall be awarded a certificate by the national committee attesting to their satisfactory completion of training and recognition as qualified journeymen. Certificates of completion are also available from the registration agency upon request by the local program sponsor for apprentices completing apprenticeship under registered standards.

National Association of Dental Laboratories Apprenticeship and Training Policy

It is a basic policy of the members of the National Association of Dental Laboratories to provide for training and opportunity for growth for all employees of its members. This, in turn,

promotes continuity and growth for all the members of the association. Such a policy is the best guarantee of the security and well-being of the Nation and of ever-increasing opportunities for the employees and owners of dental laboratories.

The fulfillment of this policy is a constant challenge in the Nation's rapidly changing technological and economic climate. It will require vigilance and frequent readjustment to meet the manpower needs of this highly technical industry.

The important objective is to meet the needs of the industry for skilled and competent journeymen. Actual laboratory experience and related instruction constitute the hardcore of training conducive to career success in the dental laboratory industry.

Trends at the present time indicate that trained personnel can be prepared for skilled jobs more efficiently and economically, and with higher standards of achievement, than was possible with traditional fixed-period training programs of the past.

It is recognized that the time needed to acquire these basic fundamentals will vary with the ability and application of the individual, the area of specialization for which he or she is training, and the facilities available to each laboratory.

Because of the rapid and inevitable changes always taking place in dental laboratory techniques, the National Association of Dental Laboratories Apprenticeship and Training Committee will maintain a constant surveillance of apprentices, apprentice problems, and new requirements. It will develop new training criteria, guidelines, and measures of attainment in the apprenticeship and other training programs as new conditions dictate. In this fashion, the National Association of Dental Laboratories can more effectively foster and promote training of greater benefit to the apprentices and the dental laboratories.

Adapting National Standards to Local Use—Program Supervision

The National Association of Dental Laboratories will oversee these national standards and their use to obtain the maximum effectiveness of local apprenticeship programs and to insure the availability of competently trained personnel to meet the needs of its membership. The meaningful adaptation of the association's stated policy and the application of

national standards to local operations will require active and continuing cooperation of the association and the individual member laboratories.

1. National Apprenticeship and Training Committee

This committee will be an administrative body named by the National Association of Dental Laboratories and comprised of operators of dental laboratories and other experts in the field of dental laboratory technology. It will be directly responsible to the association for apprenticeship and training under the purview of this agreement. The committee shall make every effort to maintain the application of these national standards among the membership of the association. Any adjustment of these standards to the needs of the industry, the development of new training criteria, guidelines, curriculum, and the application of measures of attainment rests with this committee, subject to approval by the association.

A representative from the Bureau of Apprenticeship and Training, U.S. Department of Labor, and/or the State apprenticeship agency, if one exists in the State, is available upon request to attend meetings as adviser and consultant on labor standards applicable to apprentices, on the development of administrative procedures for the conduct of apprenticeship, and on any problems relating to apprentices and apprenticeship.

2. Employers and Supervisors of Apprenticeship and Training

Responsibility for apprenticeship and training in the local laboratory usually falls upon the employer.[5]

It is recommended that the employer select a supervisor of apprenticeship and training to organize and administer the local apprenticeship program.

It shall be the duty of the employer through the supervisor to adopt local apprenticeship programs consistent with these national standards, and covering such items as:

a. Method of selecting apprentices.

b. Schedule of work experience on the job.

[5] Nothing herein supersedes existing agreements or practices between management and labor. Thus, the continued or future use of local joint apprenticeship committees, equally representative of management and labor, is recommended in the operation of local programs involving employers having a bargaining agreement with a union. In such cases, the local standards should conform as nearly as possible to these recommended national standards.

c. Progressively increasing schedule of wages for the apprentice.

d. Supplemental related instruction.

e. Provision for reviewing or testing the apprentices' progress.

f. Providing the apprentices with certificates of completion.

It shall be the responsibility of the local program sponsor to:

a. Determine the need for apprentices.

b. Approve apprenticeship selections.

c. Assure that necessary on-the-job experience and related instruction are provided.

d. Conduct periodic examination of apprentices.

e. Notify the appropriate registration agency and the association of any cancellation or termination of apprenticeship agreements.

f. Prepare and submit all necessary reports concerning its program to the local, State, or Federal agencies.

g. Supervise the enforcement of the provisions of the local apprenticeship and training standards.

3. Ratio of Apprentices

One apprentice dental technician may be employed in all shops where one dental technician is regularly employed full time (i.e., 40 hours per workweek). Thereafter, one apprentice may be employed for each additional three or major fraction of dental technicians regularly employed.

4. Filing With the Registration Agency

A copy of the local apprenticeship standards, and any amendments thereto, shall be filed with the registration agency.

5. Consultants

Guidance in the successful operation of the apprenticeship program is always available from the association representative. Advice and assistance may also be sought from the Bureau of Apprenticeship and Training, U.S. Department of Labor, the State apprenticeship agencies, and/or State departments of education.

6. Term of Apprenticeship

The term of apprenticeship for the apprentice dental technician shall be approximately either 4,000 or 6,000 consecutive hours (depending on which specialty is chosen) of on-the-job training, which shall include a minimum of 144 hours per year of related supplemental instruction. The term shall be divided into 6-month periods of 1,000 hours each. NOTE: For the specialty of technician (ceramics), it will be assumed that the apprentice has either completed the special 4-month course on tooth forms and anatomy or has equivalent experience. See section on dental technician (ceramics).

The first 500 hours shall be considered a probationary or tryout period, during which time either party may cancel the apprenticeship agreement by notifying the other. The registration agency shall be advised of all such cancellations.

Apprentice dental technicians will work with qualified dental technicians under the supervision of the laboratory manager and will receive work experience and training pertaining to the skills of dental technology. It will be their duty to familiarize themselves generally in a manner that will lead to their advancement. As they become familiar with the subjects related to the operation of laboratory equipment and methods of fabrication, they will be expected to perform any duties considered to be those of an apprentice dental technician.

During the probationary period, apprentices will have an opportunity to observe this work in its entirety, enabling them to decide whether it will be to their liking, and whether they have the ability to absorb further training.

7. Rates of Pay (40-hour week)

Dental technician (dentures); dental technician (crown and bridge):

1st 1,000 hours	50 % of dental technician's rate
2d 1,000 hours	60 % of dental technician's rate
3d 1,000 hours	70 % of dental technician's rate
4th 1,000 hours	80 % of dental technician's rate
5th 1,000 hours	90 % of dental technician's rate
6th 1,000 hours	95 % of dental technician's rate

Dental technician (ceramics):

1st 1,000 hours	70% of dental technician's rate
2d 1,000 hours	80% of dental technician's rate
3d 1,000 hours	90% of dental technician's rate
4th 1,000 hours	95% of dental technician's rate

(Apprentices who must complete special 665 hours of training on tooth forms and anatomy as a prerequisite to entering the regular 4,000-hour program for dental technician (ceramics) shall be paid at 50 percent of dental technician's rate.)

Dental Technician (casting):

1st 1,000 hours	50% of dental technician's rate
2d 1,000 hours	60% of dental technician's rate
3d 1,000 hours	75% of dental technician's rate
4th 1,000 hours	90% of dental technician's rate

8. Supervision

General supervision of this national policy shall be the responsibility of the general office of the National Association of Dental Laboratories, Alexandria, Va.

Apprentices under local programs will be supervised and trained by qualified dental technicians.

9. Modifications

The National Association of Dental Laboratories Apprenticeship and Training Committee reserves the right to make such changes in its apprenticeship and training standards as may in its judgment be necessary, subject to the approval of the national association. Such modifications shall be submitted to the Bureau of Apprenticeship and Training, U.S. Department of Labor, for approval.

Dental Technician [Dentures] 6,000 hours

		Hours
1.	**Introduction**	170
	a. Basic orientation and anatomy pertinent to the construction of complete and partial dentures	
	b. Terminology	
2.	**Preliminary Impressions and Casts**	170
	a. Review clinical impression technique	
	b. Preparation of preliminary impressions, rinsing, removal of excess water	
	c. Mix and pour plaster in upper impression	
	d. Preparation of plaster patty	
	e. Filled upper impression placed on patty	
	f. Allow proper time to set up	
	g. Pouring lower impression	
	h. Removal of impressions from plaster	
	i. Trimming casts	
3.	**Custom Impression Trays**	340
	a. Types of custom impression trays	
	b. Outlining maxillary cast	
	c. Outlining mandibular cast	
	d. Construction of custom trays	
	(1) Use of wax spacer	
	(2) Tinfoil substitute	
	(3) Materials for custom tray	
	(4) Adopting soft tray material	
	(5) Trimming soft tray material	
	(6) Construction of handle	
	(7) Removal of tray from cast	
	(8) Final trimming and polishing	
4.	**Preparation of Master Casts**	170
	a. Handling of final impressions	

Hours

b. Construction of master casts (three methods)
   (1) Pouring final impressions and investing
   (2) Pouring final impressions without investing
   (3) Boxing final impressions

5. **Construction Baseplates** 170
   a. Shellac baseplates
   b. Matrix-type stabilized baseplates
   c. Sprinkle method of stabilized baseplates

6. **Occlusion Rims** 390
   a. Use of occlusion rims
   b. Proper contouring of occlusion rims
   c. Length of occlusion rims
   d. Methods of constructing occlusion rims
      (1) Occlusion rim former
      (2) Hand-formed occlusion rims

7. **Articulators and Mounting Casts** 390
   a. New terminology
   b. Types of articulators
   c. Jaw and articulator movements
   d. Manipulation of Hanau H-2 articulator
   e. Clinical procedures for recording maxio-mandibular relations
   f. Laboratory procedures for mounting casts on articulator

8. **Setting Up Teeth — Partial and Full Dentures** 1,000
   a. Positioning of each individual tooth on model, taking into consideration esthetics, phonetics, and function; using various types of articulators in accordance with the dentist's instructions
   b. Grinding into articulation remaining missing teeth needed for the partial, stressing butted teeth where esthetically accepted

Hours

9. **Festooning—Carving the Denture Base to Develop Natural Structure and Anatomy** 340
   a. New terminology
   b. Procedures for festooning complete dentures
      (1) Removal of casts
      (2) Waxing "drip" method, "press on" method
      (3) Contouring—anterior area
      (4) Contouring—posterior area
      (5) Carving around individual teeth
      (6) Stripping
   c. Posterior palatal seal
   d. Wax dentures sealed to casts and returned to articulator
   e. Removal of casts
   f. Use of preformed patterns

10. **Flasking, Packing, and Processing a Complete Denture** 500
   a. Regular and pour-cure fluid resin
   b. Parts of flask
   c. Secure cast to base of flask
   d. Secure upper half of flask, vibrate stone in all crevices until all teeth are covered; wipe stone from occlusal surfaces
   e. Paint on separating medium and fill remainder of flask
   f. Wax elimination
   g. Packing
      (1) Monomer and polymer mixed to manufacturer's specifications
      (2) Under pack and gradually build up; test pack, or overfill and remove excess and pressing
   h. Place flask in processing clamp
      (1) Clamped flask is placed in curing unit

Hours

(2) Nine hours at 165°F or 1 hour at 165°F, then boiled at 212°F for one-half hour

i. Removal of flask and stone

(1) Flask ejector

(2) Removal of stone by plaster saw, plaster nippers, or pneumatic air hammer

11. Finishing 340

a. Remove excess material to outline required in finished product

b. Shaping and trimming excess material around teeth; festooning with burs and sanders in preparation for polishing

12. Polishing 340

a. New terminology

b. Use of wet pumice with brush wheel and muslin buffing wheel

c. Tripoli applied with dry muslin buffing brush

d. Final polish with high shine

e. Final scrubbing

13. Wrought Bars and Clasps 680

(This phase of the course familarizes the trainee with simple principles of wrought clasps and bar designing. Investing techniques, soldering, and partial denture processing in acrylic, using the regular and pour-cure techniques.)

a. Bending clasp wire

(1) Pouring of the partial casts

(2) Outline of clasps and bar on cast

(3) Construction of clasp and bar following outline

(4) Bending and shaping of retention loops

(5) Assembling of all units

Hours

(6) Waxing and bracing units

(7) Removal of assembled bar and clasps from cast

(8) Investing preparatory to soldering

b. Soldering of assembled lingual bar

(1) Wax elimination

(2) Heat soaking

(3) Soldering

(4) Pickling

(5) Trimming and heat treatment

(6) Finishing and polishing

14. Flasking, Packing, and Processing 500

a. Regular method

(1) Bank

(2) Split

(3) Carryover

b. Pour and cure fluid resin (follow manufacturer's instructions)

15. Finishing and Polishing (See sections 11 and 12 for these procedures.)

16. Repairs 500

a. Preparing all types of dentures for repairs, addition of parts, grinding in replacement of teeth

b. Bending and adapting wrought gold and steel wires to replace broken components

21

Dental Technician [Crown and Bridge] 6,000 hours

	Hours
1. Basic Orientation and Introduction to Fixed Restorative Techniques	160
a. Introduction	
b. Terminology	
2. Types of Fixed Restorations	340
a. Terminology	
b. Crowns	
c. Veneered	
d. Partial	
e. Jacket	
f. Fixed bridge	
g. Types of pontics based on materials used in construction	
h. Types of pontics based on form	
i. Contour of pontic tips	
j. Connectors	
3. Impression Casts and Dies	640
a. Impression materials	
b. Impression trays	
c. Materials for casts and dies	
d. Impressions for fixed restorative procedures	
e. Pouring impressions for diagnostic casts (made from alginate impressions)	
f. Custom impression trays	
4. Developing Working Casts from Tray Impressions	600
a. Types of tray impressions	
b. Methods of pouring tray impressions and obtaining casts	

Hours

c. Working casts with removable dies
   (1) Stripping technique
   (2) Stripping with hydrocolloid impression
   (3) Double pour sawout technique
d. Paralleling dowel pins before pouring
e. Di-Lok tray technique

5. Developing Dies from Band Impressions 640

a. Band impression used and materials
b. Pouring a stone die in the band impression
   (1) Objectives of stone die
   (2) When margins recorded in confines of band
   (3) When portion of margin is recorded in rubber beyond end of band
   (4) Recovery of die from impression
c. Electroformed dies
   (1) Advantages and equipment
   (2) Copper plating—compound impressions
   (3) Silver plating—rubber base impressions

6. Preparation of Dies [Stone] 340

a. Trimming the root portion to permit withdrawal from the cast
   Die with no dowel pin—flat surface or grooves carved for index
b. Definition of margin
   (1) Importance of accurate margin to finished case
   (2) Ditching the die
c. Preparation of die surface
   (1) Undercuts blocked out
   (2) Die lubricated after trimming and ditching completed

Hours

7. **Developing Working Casts from Transfer Impressions** 340
   a. Tray impressions—hydrocolloid or rubber base impression material
   b. Transfer impressions
   c. Coping transfer impressions
   d. Technique for coping transfer impressions
      (1) Development of copings
      (2) Taking the impression
      (3) Assembling and pouring impression
      (4) Removing working casts from impression
   e. Semiaccurate transfer impressions

8. **Tooth Forms and Anatomy** 640
   a. Orientation to classification of teeth and tooth anatomy
   b. Carving 1 x 28 from plaster or wax blocks (average size)
   c. Wax-up technique
      (1) Preparation of stone cast—surfaces of each tooth cut down, some teeth may be cut off at the gingival margin
      (2) Build up with wax to correct anatomy of each tooth prepared on the stone cast
   d. Drop-wax technique (applying wax with spatula to the prepared occlusions of a stone cast)

9. **Relating Opposing Tooth Surfaces to the Working Casts** 600
   a. Development of occlusion as related to the three techniques for pattern development
      (1) Direct technique (wax chew-in)
      (2) Indirect technique—wax occlusal registration

Hours

(3) Occlusal cores

(a) Advantages of occlusal cores
(b) Articulation of cores

b. Anatomic opposing casts

(1) Simple inlay, crown or small bridge

(2) Multiple small restorations or large single restorations mounted on adjustable articulator

10. Spruing and Investing 340

a. Spruing

(1) Sprue formers

(2) Crucible formers

(3) Diameter and area attachment of the sprue

(4) Reservoirs prevent shrink spot porosity

(5) Attaching sprues

(6) Sprue lengths and venting

(7) Orientation of the sprue

b. Investment techniques

(1) Shrinkage of gold alloy

(2) Investment expansion

(a) Setting expansion

(b) Hygroscopic

(c) Thermal expansion

(3) Burnout procedures

(4) Types of investment

(5) Controlled water and added investment technique

(6) Control of expansion

c. Technical procedures

(1) Spruing

(2) Investing procedures

(a) Thermal expansion technique

(b) Water immersion hygroscopic technique

Hours

(c) Water added hygroscopic technique

(3) Removal of sprue base and sprue pin

11. Wax Elimination and Casting 260

a. Wax elimination

(1) Purposes

(2) Furnace

(3) Temperature

(4) Time

(5) Placement of ring in furnace

b. Casting

(1) Equipment

(a) Melting machines

(b) Gas/oxygen or gas/air blowtorch

(2) Casting machines

(a) Air pressure casting machine

(b) Centrifugal casting machine

(3) Preparation for casting

(a) Balancing centrifugal casting machine arm

(b) Casting accessories

(4) Casting with centrifugal machine and gas/air blowpipe

(5) Casting with centrifugal machine and electrifugal machine and electric muffle

12. Processing Tooth-Colored Resins 600

a. Forming white wax to simulate natural teeth and placing in the front of the various gold veneer units

b. Imbedding the white wax veneer goldwork in plaster

c. Opening of flask and washing away of wax

d. Opaquing the gold framework

e. Mixing plastic powder with resin liquid to create proper shade submitted by dentist

Hours

f. Mixing dough to proper consistency and placing mixture into flask on the surface of the opaqued area

g. Test pack by closing flask under pressure, reopen flask, and remove excess material

h. Cut away at the cutting edges of teeth and place translucency plastic

i. Reclosing flask under press

j. Placing flask in spring compensating device and immersing in boiling water or vacuum atmosphere oven for curing and hardening resin

k. Reopening flask and removing bridge from encased plaster

l. Grinding and polishing the cured plastic

13. Finishing and Polishing of Goldwork 500

a. Finishing of gold crown and bridgework

(1) Cutting sprue from the cast

(2) Shaping gold to an anatomical form

(3) Smoothing all rough surfaces

b. Finishing, polishing, and high shining with rouge and other shining agents on dental lathe

c. Check for marginal fit, proper solder connections, color matching, and proper finishing and polishing

Dental Technician [Ceramics] 4,000 or 4,665 hours [1]

1. Introduction to Types of Porcelain Restorations 160

a. Terminology

b. Types of fixed restorations in porcelain

[1] The addition of the section on tooth forms and anatomy for apprentices who have not had instruction on fixed crown and bridgework increases the training time by 4 months or 665 hours.

Hours

c. Diagnosis and treatment planning
   (1) Clinical
   (2) Laboratory

2. **Tooth Forms and Anatomy** 665

(A prerequisite for students who do not have equivalent instruction or experience in fixed crown and bridgework.)

a. Orientation to classification of teeth and tooth anatomy
b. Carving 1 x 28 from plaster or wax blocks (average size)
c. Wax-up technique
   (1) Preparation of stone cast surfaces of each tooth cut down, some teeth may be cut off at the gingival margin
   (2) Build up with wax to correct anatomy of each tooth prepared on the stone cast
d. Drop-wax technique (applying wax with spatula to the prepared occlusions of a stone cast)

3. **Waxing of Coping—Single and Multiple Units** 500

a. Terminology
b. Waxing coping for single crown
c. Wax-up for facial veneer type crown
d. Posterior veneer crowns
e. Waxing for bridge abutments
f. Waxing pontics
g. Porcelain faced crowns

4. **Spruing and Investing** 500

a. New terminology
b. Spruing
   (1) Sprue formers
   (2) Crucible formers
   (3) Diameter and area attachment of the sprue
   (4) Attaching sprues

Hours

(5) Sprue lengths and vesting
(6) Orientation of the sprue

c. Investing
(1) General considerations
(2) Technical procedures
(3) Investing procedures, high temperature
(4) Investing procedures, hygroscopic

5. **Wax Elimination and Casting** 350

a. New terminology
b. Wax elimination
(1) Purposes
(2) Furnace
(3) Temperature
(4) Time
(5) Placement of ring in furnace

c. Casting
(1) Equipment—melting machines
(2) Preparation for casting
(3) Casting machine balanced and wound
(4) Casting with centrifugal machine and electric muffle

6. **Soldering and Preparing Metal Framework to Receive Porcelain** 500

a. New terminology
b. Crowns or pontics to be connected
c. Invest
d. Boilout and preheat before soldering
e. Soldering
f. Preparing units for porcelain
g. Degassing metal

7. **Application and Firing of Opaque on Metal** 160

a. New terminology
b. Mixing and applying opaque porcelain

Hours

c. Baking the opaque porcelain
d. Corrections

8. **Building Up, Contouring, and Baking in Porcelain** 665
   a. New terminology
   b. Building up for the first bake
   c. Building up for the contour
      (1) Applying the incisal
      (2) Blending the incisal
   d. Carving
   e. Shrinkage
   f. Baking of porcelain
      (1) First bake
      (2) Second bake

9. **Final Glaze and Staining** 500
   a. New terminology
   b. Preparing for the glazing bake
   c. Glazing
   d. Staining
   e. Applying stains

10. **Construction of Porcelain Jacket** 665
   a. New terminology
   b. Platinum matrix
   c. Methods of making platinum matrix
   d. Applying the opaque
   e. Firing the opaque
   f. Building the crown
      (1) First bake
      (2) Second bake
      (3) Contouring and glazing
   g. Removing matrix

Dental Technician [Casting] 4,000 hours

Hours

1. **Introduction to Removable Cast Partials** 160
   a. Terminology
   b. Classification of removable cast partials
   c. Treatment procedures
      (1) Clinical
      (2) Laboratory

2. **Surveyor** 500
   a. Use of the surveyor
   b. Desirable and undesirable undercuts
   c. Cast design
      (1) Unilateral
      (2) Horseshoe
      (3) Bilateral
      (4) Palatal and lingual bars
      (5) Double palatal bar
      (6) Kennedy bar
      (7) Lower lingual plate
   d. Clasp Design
      (1) Akers
      (2) Roach or bar clasp
      (3) Back-action clasp
      (4) Ring clasp
      (5) Combinations
      (6) Indirect retainer

3. **Production of the Refactory Cast** 330
   a. New terminology
   b. Procedure for producing a refactory cast
   c. Use of bead line when constructing upper cast

Hours

4. **Pattern Construction** 670
   a. New terminology
   b. Freehand waxing technique reviewed
   c. Framework outlined on investment cast
   d. Wax or plastic patterns selected and placed
      (1) Combination of wax patterns
      (2) Freehand waxing carved to proper contour for various types of framework on upper and lower casts

5. **Spruing, Investing, and Casting** 670
   a. New terminology
   b. Spruing maxillary partial denture using a sprue base
      (1) Auxiliary sprues attached
      (2) Cast attached to sprue base
      (3) Main sprue hole filled with wax
   c. Investing maxillary partial denture
      (1) Casting ring lined with asbestos
      (2) Pattern coated with surface tension reducing agent for gold or protective coat for chrome alloy
      (3) Investment vibrated into casting ring
   d. Spruing mandibular partial denture
   e. Investing mandibular partial denture
   f. Casting
      (1) Casting machine balanced and prepared
      (2) Investment patterns placed in cold oven or it may be preheated up to 1,200° F (Follow manufacturer's recommendations.)
      (3) Operation of melting equipment
      (4) Removal of cast from investment

6. **Finishing and Polishing** 670
   a. Sprues removed and finished down with coarse stones

Hours

b. Framework finished with mounted stones into desired shape and finish

c. Rubber-wheeling

(1) Bars, saddles, and clasps

(2) Rubber point for inside of clasp

d. Polishing compound

Felt wheels and points with high-gloss compound

e. Electrolytic polishing

7. **Setting Up Teeth; Partial Dentures** 500

a. Selection of teeth

b. Grinding and setting in the necessary teeth for partial dentures

c. Waxing for finish

8. **Flasking, Processing, and Finishing** 500

a. Flasking (For pour-cure fluid resin, follow manufacturer's instructions.)

(1) Casts removed from mount

(2) Casts placed in stone to bottom of flask

(3) Separating medium

(4) Flask assembled—stone poured to occlusal surface of teeth

(5) Capping poured and lid placed on flask

b. Processing

(1) Regular

(2) Pour-cure

c. Finishing

(1) Flask removed and base contoured

(2) Denture base resin polished